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A NEW INTERNATIONAL AIRPORT
FOR TORONTO

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PURPOSE OF THE STUDY

The location of a new international airport is more than just the decision to build a large transportation facility. Such an airport is the heart of a vast complex of industries, businesses and housing, on and off the airport site. The economy, social structure, and physical environment will be affected in communities for many miles around. The pattern of growth of the metropolitan region will also be significantly affected by the location and timing of the airport's development.

The sheer magnitude of the new international airport for Toronto, expected to be 4-5 times larger than the present Malton operation by 1990, means that extreme care must be taken in choosing a site. At the very least, the location of the new airport should cause the least disjuncture of present development and should not unfavorably constrain future development in the region or be constrained by it. In short, the decision to locate the new international airport for Toronto should be made with regard to the impact of the facility on the economic development and structure of the region and its affected areas. The purpose of this study is to provide a description of that impact in such a way that differences in impact among the alternative sites can be appraised. We shall refer to the new airport as TORONTO II.

TERMS OF REFERENCE

The study has been carried out within the terms of reference listed below:

- 1) To examine the impact of the new Toronto International Airport on the economic development and regional structure of the Toronto-Centred Region as a whole;
- 2) To examine the impact of the new Toronto Airport on the economic development and structure of the alternative sites under study;
- 3) To evaluate the development of the new Toronto Airport at alternative sites having regard to the criteria for regional development established by the Regional Development Branch, Ontario Department of Treasury and Economics;
- 4) To prepare development concepts for each alternative site showing population distribution and urban centers able to meet the impact of a new Toronto Airport.

THE CONCEPT OF AN AIRPORT COMPLEX

The average air traveller is well aware that a host of administrative, commercial, and servicing activities are necessary for the successful and efficient departure or arrival of his flight. Air traffic control, ticketing, baggage handling, customs, food service, etc. are visible to him. Less obvious to the air traveller are such activities as aircraft maintenance, cargo and mail handling,

and aircraft parts repair. Some or all of the latter activities may be conducted at the airport or at some distance away. Add to these the travel and accommodation services of hotels and motels, ground transportation, and travel agencies and one starts to get a clearer idea of how the initial stimulus of an airport is diffused through a wide range of jobs in locations on and off the airport site. Finally, there are the households of all the employees of the activities indicated which must be serviced with stores, offices, professional services, government services, recreation and cultural activities, etc.

In order to capture the extent and degree of impact of an airport facility such as TORONTO II, the concept of an "airport complex" is utilized.¹ That is, the set of activities which are closely linked to one another through the establishment of the airport are considered to comprise the airport complex through which the impact must be traced. Conceived in this way, TORONTO II has three main components: (1) activities necessary to maintain the airport and its passenger and cargo handling operations; (2) activities which depend upon the level of operation of passenger and

¹It is analogous to the notion of an industrial complex as employed by Walter Isard, Methods of Regional Analysis, Cambridge, Wiley, MIT Press, 1960.

cargo movements; and (3) activities necessary to service the households of employees associated with the airport and airport dependent activities.

The first component of the airport complex we refer to as AIRPORT OPERATIONS, and the second as AIRPORT DEPENDENT activities. Both of these comprise the BASIC COMPLEX and, much in the same vein as the "base" industries in the community economic base concept,¹ they generate the need for further employment activities in the community affected by the BASIC COMPLEX. The third component is, thus, referred to as COMMUNITY INDUCED activities. In the following table the relationships prevailing in the basic complexes of Malton and Dorval airports are shown. The similarities between the two airports are striking. Figure 1 shows the more general relations in the airport complex to which we are referring.

¹Among the most concise explanations of this concept is Charles Tiebout, The Community Economic Base Study, New York, Committee for Economic Development, 1965.

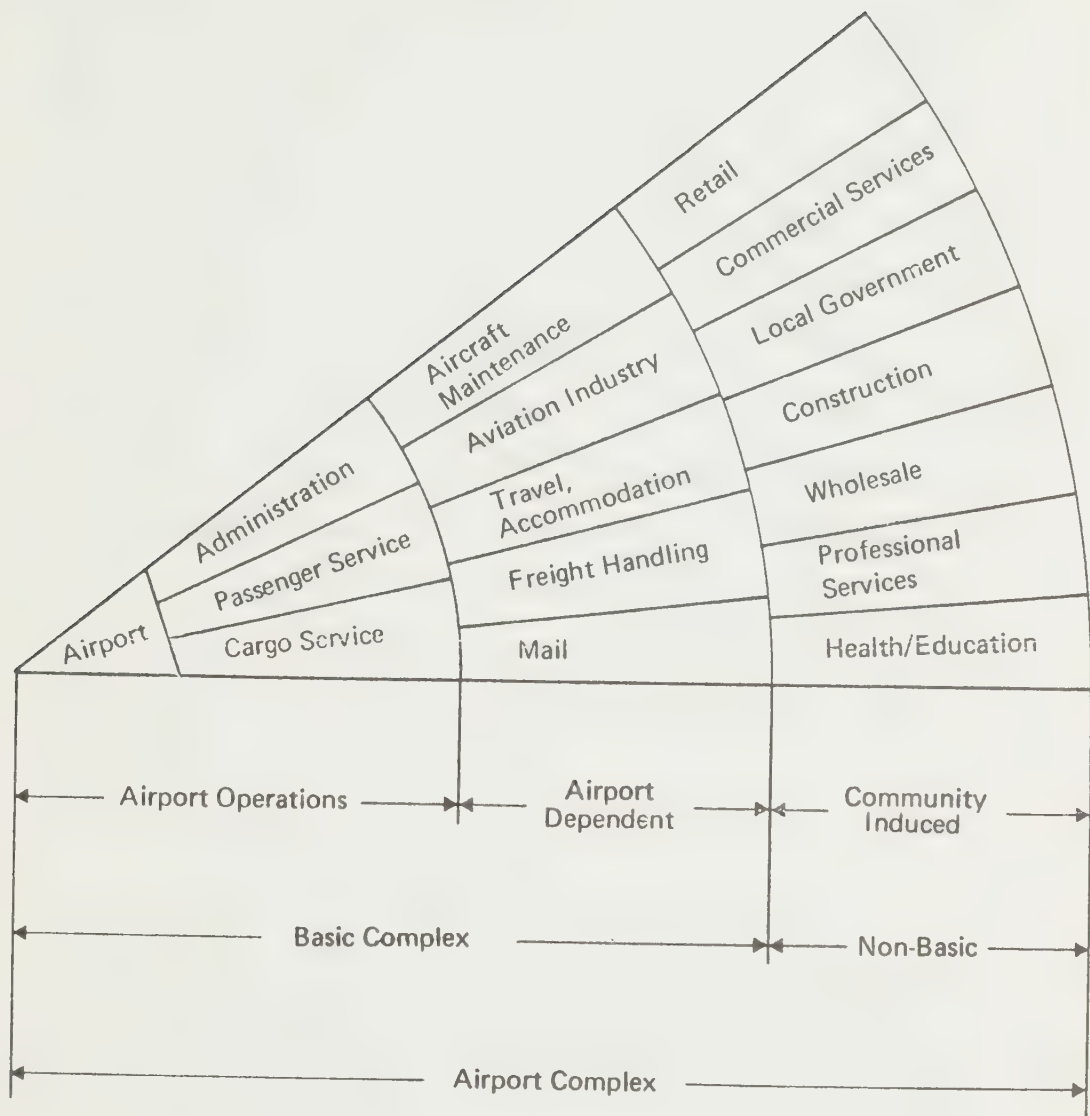
TABLE 1

EMPLOYMENT IN THE BASIC COMPLEX AT MALTON
AND DORVAL AIRPORTS

	<u>MALTON</u> ¹		<u>DORVAL</u> ²	
	No.	%	No.	%
<u>A. Airport Operations</u>	<u>4,950</u>	<u>42.2</u>	<u>6,339</u>	<u>39.2</u>
1) Airport Administration	820	6.9	1,094	6.7
2) Passenger Operations	3,915	33.3	4,757	29.5
3) Air Cargo	215	1.8	488	3.0
<u>B. Airport Dependent</u>	<u>6,780</u>	<u>57.8</u>	<u>9,781</u>	<u>60.8</u>
1) Aircraft Maintenance	1,280	11.0	3,550	21.9
2) Aircraft Servicing Ind.	1,750 ³	14.9	2,000 ³	12.3
3) Travel/Accommodation	2,900	24.8	3,197	19.7
4) General Aviation	350	2.9	217	1.3
5) Cargo/Brokers/Mail, Etc.	500	4.2	817	5.0
<u>C. Total Basic Airport Complex</u>	<u>11,730</u>	<u>100.0</u>	<u>16,120</u>	<u>100.0</u>

- Sources: 1. Canada, Dept. of Transport, "Employment Impact of Toronto Airport II - 1985", 1969.
2. Benjamin Higgins, "Economic Impact of Alternative Sites For the Proposed New Montreal International Airport", Jan. 1969.
3. Estimated.

Fig. 1 THE AIRPORT COMPLEX



From this table it can be seen that the "multiplier effect" of the airport operations activities is between 1.3 and 1.5 in generating airport dependent activities employment. It is expected that this basic complex would, in turn, generate as many jobs again in the community. These employment relationships in the airport complex are important because employment in the basic complex, it has been assumed for this study, is directly related to air passenger traffic using the airport. Thus, impact of the airport on employment is through the expected level of air passenger traffic. At present, there is a ratio of one employee in the basic complex for every 400 passengers using Malton Airport. It is expected that larger aircraft and more efficient passenger and cargo operations will reduce this ratio in the period when TORONTO II will come into existence to about one for every 650 passengers.¹

The forecasts for air passenger traffic using TORONTO II, transformed into employment forecasts in this way are fundamental to this study. The scale of the impact anticipated for TORONTO II and the time at which it is likely to occur are, therefore, closely linked to air passenger

¹These ratios are comparable to those used by Canada Dept. of Transport in relating air passenger traffic to "direct" employment at Malton and TORONTO II. "Direct" employment is equivalent to nearly 60% of the "basic complex" employment.

forecasts of the Canada Department of Transport. Further reference to these forecasts and their implications will be made later.

One other facet of the airport complex remains to be discussed. It concerns the place of the aircraft and aviation manufacturing industry. Extensive probing of this question indicates that aircraft manufacturing should not be considered part of the airport complex. The DeHaviland and Canadair plants in Toronto and Montreal, respectively, are not even located at the international airports in their cities nor do they use these facilities in their manufacturing operations. Douglas Aircraft in Toronto was linked to Malton, under its previous owner, but its operations now involve only aircraft components manufacturing. It could be located just as well in a variety of other locations within the metropolitan area. Also, the suppliers to the aircraft industries have no particular affinity to an airport location. Thus, continued growth of aviation industries will not be contingent upon the establishment of a new international airport, and it is even unlikely that such industries would locate at TORONTO II in any case.

A WAY OF LOOKING AT IMPACT

It is generally assumed that the introduction of a large-scale facility -- a dam, an expressway, a manufacturing plant -- into an area can be viewed in much the same way as the physical reaction of one object striking another. But the analogy of "impact" in the physical world is of only limited usefulness in describing effects of interactions in the social/economic world. For example, a new international airport of the scale and character envisioned for Toronto may be seen as (a) a physical facility, (b) an employment centre, or (c) a regional development device. We are, of course, interested in the impact it might have in each of these roles.

Besides distinguishing the question, "Impact of what?", we shall have to ask; "Impact on what?". Thus, as a physical facility TORONTO II will demand space, affect the natural environment, and require capital, to point up only a few of the aspects on which it will have an impact. As an employment centre, TORONTO II will demand labor, affect income, and affect the mix of industry in its locale. It should also be obvious that the demands made by a large new airport may fall either on the region (as with capital requirements) or on the locale of the airport (as in the space

requirements) or on both (as with the labor market demands).

Since the notion of impact is a relative one, it is necessary to pose both of the foregoing questions -- "Impact of what?", and "Impact on what?" -- in light of certain relationships. That is, we may wish to see the impact in relation to what is there now, or in relation to what might be there, or in relation to standards of development. Impact of a large-scale facility, for example, on an existing small population base will appear differently from that same facility introduced into an area of small, but rapidly growing population. The area might even sustain population growth equal to that anticipated by the facility.

Furthermore, the measurement of impact is usually presumed to be viewing the effects of an interaction -- that is, before and after. We should, by that token, be able to see the actual results of introducing TORONTO II into the region or to have available some comparable experience from which we could predict the results of TORONTO II being introduced. Unfortunately, the first is not possible and the second does not exist. We shall have to rely not only on estimates of the scale, nature and timing of the new airport but also on forecasts of the effects it might have. The ordinary rules of thumb for making simple predictions are not likely

to apply in impact situations because of unknown factors that are involved. Moreover, there is the possibility that the predictions may act as "self-fulfilling prophecies" and have a bearing on what actually takes place.¹ If there is a lesson in this, it is that estimates of impact should be constantly reviewed, updated, and changed if necessary in light of actual conditions of airport construction and operation.

In the report that follows, the "impact" of TORONTO II is analyzed; first, as a facility, an airport complex, which will make specific demands on employment, land use, capital, and other resources in a certain time framework. The impact of these demands constitute the second aspect in the discussion and are looked at in terms of impact on the region and on the localized impact areas surrounding each site. A third relative picture of impact is gained by evaluating regional development criteria. Fourth, possible development concepts are presented which might be used to respond to the airport complex in any of the alternative impact areas. Finally, the implications for regional development policy are considered.

¹See for example, Gerald Breese et al, The Impact of Large Installations on Nearby Areas, Los Angeles, Sage Publications, 1965, P. 464.

PART ONE

THE DEMANDS OF THE
AIRPORT COMPLEX

THE DEMANDS OF THE AIRPORT COMPLEX

Before raising specific issues of impact of TORONTO II, it is important to establish the nature of the airport complex to which the region will have to respond. This section of the report, thus, is concerned with defining the size, character and timing of the development of the airport complex, particularly as it makes demands on population and employment, land use, capital investment, and income flows.

To describe the demands of the airport complex it has been necessary to set a baseline date for the analysis of TORONTO II. This date is set at 1990. It corresponds to the date at which TORONTO II is expected to reach "relative maturity". Although the precise opening date for TORONTO II has not been established, it is assumed to be at or near 1980. Whenever TORONTO II does open, it will have to accommodate, by 1990, a flow of air passengers equal to about five times Malton's present total. The latter assumption follows from the estimates of air passenger flows and the distribution between the two airports made by the Canada Department of Transport.

Thus 1990 will see in operation a strong airport complex against which we can better judge the nature of the impact -- i.e., it will be sufficiently large and distant in time to establish a perspective for response. All of the analyses have this 1990 cross-section. In addition, assuming 1980 to be the opening date for

TORONTO II, the perspective is drawn back to 1980, where possible, and up to 2000, where appropriate.

SIZE, CHARACTER AND TIMING OF TORONTO II

The Size of the Airport Complex

First and foremost, TORONTO II will be large -- very large. Mention has already been made of it being up to five times larger than Malton is at present. Forecasts made by the Canada Department of Transport show total air passenger flow through Toronto airports at about 30 million passengers per year in 1990. TORONTO II will handle two-thirds, or about 20 million passengers, through its terminal yearly. (The corollary, of course, is that Malton will also double its passenger flow in the same period.) While there is some reason not to be entirely salutary about these forecasts (see Appendix A), it is important to be prepared to respond to the possibility of such a large facility. To give it a further perspective, TORONTO II at 20 million passengers will be larger than either Chicago's O'Hare or New York's three major airports are in passenger volume at this time.¹

¹ S.G. Lardiere and F.E. Jarema, "Impact of Projected Air Travel Demand on Airport Access," in Highway Research Record, E.W. Jackson ed., Washington: National Research Council, 1969, Number 274, P. 24.

The volume of air passengers determines many important features of the size of the airport complex. Table 2 gives the magnitude of TORONTO II in terms of several key sectors. The airport facility will occupy or directly impinge on up to 130 square miles of land, the appropriately named "noise lands".¹ The airport complex will demand labor at a volume of about 51,000 workers, directly or indirectly associated with airport operations. The total population associated with this level of employment will be about 139,000 or the equivalent of the population of Kitchener and Waterloo.² This will have to be accommodated largely within 20 miles of the airport site.

TABLE 2

Key Measures of Size of the TORONTO II Airport Complex					
At "Relative Maturity", 1990					
(1)	(2)	(3)	(4)	(5)	(6)
Airport Complex Employment	Associated Population	Urban Land Needs (Acres)	Noise Lands (Acres)	Capital Investment (Total) MILLIONS, 1969 CURRENT DOLLARS	Income Flow (Annual)
51,000	139,000	9,179	82,800	2780.2	565.5

Notes: Figures are averages from among the four sites.

¹This follows the concept proposed in "Aircraft Noise at Malton Airport;" a report prepared by the Ontario Department of Municipal Affairs and presented by the Minister, Darcy McKeough, on October 9, 1969.

²Source: DMA Municipal Directory, 1970.

The land use needs generated by the new population will demand almost 10,000 more acres in addition to the noise lands. Again, most of this demand will be in nearby communities. The capital investment demanded by the new airport facility and the associated urban development will amount to about \$3 billion, while the income flow to employees in the airport complex will amount to around \$565 million annually by 1990.

The Character of the Airport Complex

What will TORONTO II be like, besides its sheer size? There are two characteristics of TORONTO II which will affect its demands upon the region. One is the nature of the complex itself; the kinds of activities contained in it, the volume of employment in each activity and their linkages to one another. The other characteristic is the spatial pattern the airport complex will assume.

The idea of the airport complex and its components has already been introduced. Referring, again, to Table 1, the composition of the Basic Complex can be seen. With minor modification, the same proportion of employment in the various categories of the present Malton and Dorval complexes has been applied to the projected 1990 level for TORONTO II. The composition of the Basic Complex, thus derived, is given in Table 3. Components such as airport

TABLE 3

COMPOSITION AND GROWTH OF BASIC AIRPORT
COMPLEX EMPLOYMENT, 1980 - 2000

	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>%</u>	<u>2000</u>
A. <u>AIRPORT OPERATIONS</u>	<u>5,700</u>	<u>8,000</u>	<u>11,000</u>	<u>41.5</u>	<u>22,000</u>
1. Airport Administration	500	750	750	3.0	1,500
2. Passenger Operations	5,000	7,000	10,000	37.5	20,000
3. Air Cargo	200	250	250	1.0	500
B. <u>AIRPORT DEPENDENT</u>	<u>8,000</u>	<u>11,000</u>	<u>15,500</u>	<u>58.5</u>	<u>31,000</u>
1. Aircraft Maintenance	2,000	3,000	3,800	14.2	7,600
2. Aircraft Servicing Industry	1,300	2,000	2,600	10.0	5,200
3. Travel/Accomodation/Service	3,400	4,000	6,800	25.6	13,600
4. General Aviation	300	500	600	2.3	1,200
5. Cargo, Brokers, Mail, etc.	<u>1,000</u>	<u>1,500</u>	<u>1,700</u>	<u>6.4</u>	<u>3,400</u>
C. <u>TOTAL BASIC AIRPORT COMPLEX</u>	<u>13,700</u>	<u>19,000</u>	<u>26,500</u>	<u>100.0</u>	<u>53,000</u>

NOTES: Based on forecasts of "Scheduled Passenger Traffic" supplied:
Canada, Department of Transport, Ottawa, Conveyed by F. Heaps,
December 23, 1969.

administration were judged not likely to increase proportionately with increased airport size; and aircraft maintenance employment is contingent upon rather "lumpy" investments in plant and equipment. Employment associated with passenger services, however, is expected to grow faster than other component employment.

Only about one-fifth of the airport complex employment is directly connected with "running the airport" and servicing the passengers and cargo flowing through it. A further nearly one-third of the complex employment provides services to the airport, to aircraft, to passengers and to cargo. Within this group it is expected that several aircraft maintenance depots will be needed at TORONTO II. As well, a sub-complex of hotels, restaurants, entertainment and travel services will be spawned. No reliable data or method for estimating the scale of the latter exists, but, on the basis of our present two large airports, it could amount to 3,000 or more hotel rooms and ancillary services.

The largest volume of employment, about one-half of the complex, will be associated with providing public and private services in nearby communities. The demand for these jobs will arise because of the population drawn to the area of the airport to take up the jobs of operating and servicing the airport facility. The derivation of this "induced" employment is shown in Table 4. If we were to list the types of jobs which will come under this component,

TABLE 4

TOTAL JOBS GENERATED FOR ALTERNATIVE SIZES (1990)

<u>SITE</u>	(1) <u>Airport Jobs</u>	(2) <u>Airport Dependent Jobs</u>	(3) <u>Basic Complex (Col. 1+2)</u>	(4) <u>Non-Basic Employment Multiplier</u>	(5) <u>Non-Basic Jobs (Col. 4X3)</u>	(6) <u>Total Employment (Col. 3+5)</u>
A.	11,000	15,500	26,500	1.0	26,500	53,000
B.	11,000	15,500	26,500	0.9	24,000	50,500
C.	11,000	15,500	26,500	0.8	21,000	47,500
D.	11,000	15,500	26,500	1.0	26,500	53,000

NOTES: Col. 1, Airport jobs assumed to be the same at all sites.

Col. 2, Closely-linked jobs base = 1.4 (Airport Jobs), but could vary slightly by:

A) Direction from Toronto - new ind. not as likely to be attracted north or east.

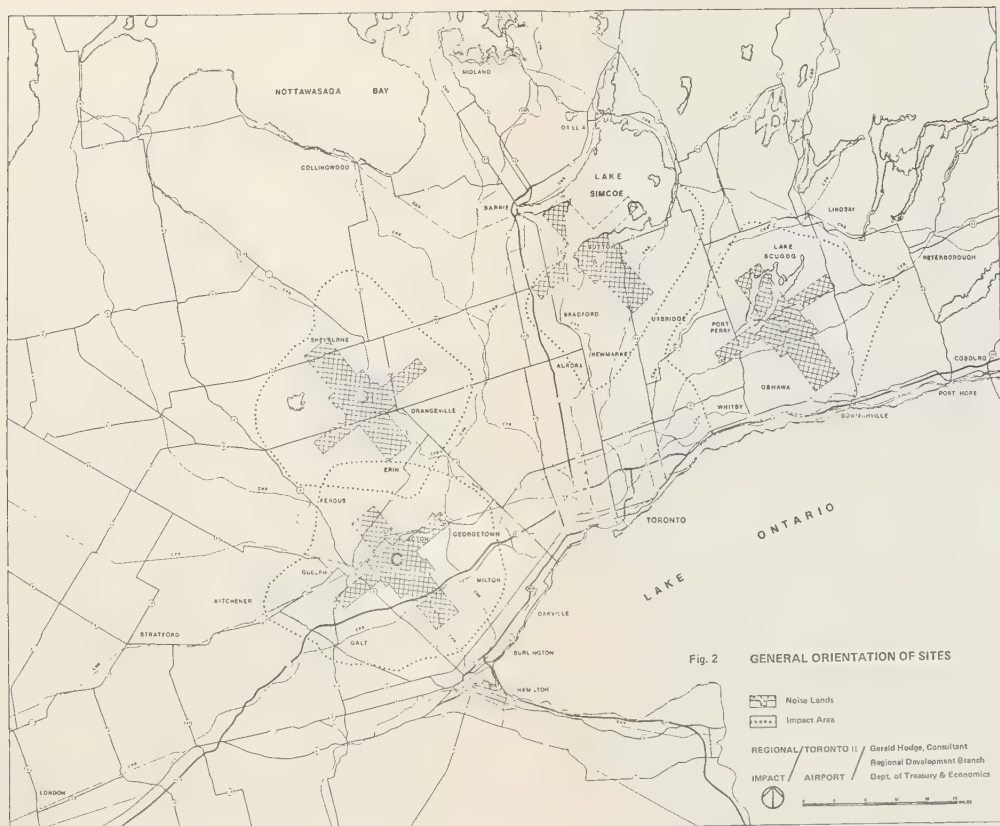
B) Distance from Malton - near to Malton must compete with Malton.

Col. 4, Multiplier is reduced for those areas already possessing substantial capacity in the local tertiary sector which might be more highly utilized.

they would appear to be rather mundane. But because they are only retail clerks, school teachers, construction workers, doctors, appliance servicemen, bakers, etc. should not detract from their importance in appraising the demand of the TORONTO II complex. Employment thus induced in the community, indeed, is the largest segment and with its associated population will exert the largest proportion of demand on urban services, housing, land and facilities in the affected area.

The spatial character of the complex is, of course, closely related to the activities of the complex. All of the activities demand space and also demand, to a greater or lesser degree, certain locations relative to other activities of the complex. For example, airport operations activities will be found at the airport facility, whereas those jobs in airport dependent activities will need to be located at the airport in some cases, but not in all. A further distinction needs to be made between the pattern of jobs and the pattern of residence because the activities in the community induced component will be located relative to where employees in the first two components reside.

Some jobs will be located within the noise lands, but it is not expected that any residences of airport workers will be established there. The parameters which are expected to affect the distribution of places of employment and places of residence are given in Table 5. According to them, it can be anticipated that the spatial



demands of the TORONTO II complex will be made largely on a zone extending up to 30 minutes driving time or 20 miles around the airport site.¹ We call this the Impact Area for a site; they are shown for each site on Figure 2.

Because the possible airport locations are well beyond the metropolitan area, the bulk of the demand for residences and the location of employment will fall upon communities in the Impact Area. As much as 85 percent of the employees in the complex will live within the Impact Area. The remaining 15 percent account for persons who may choose to live well beyond 30 minutes from their job. The latter represent a "leakage" of population and induced employment from the Impact Area but, it must be remembered, will have to be accommodated elsewhere and are still part of the total demand of the complex on the region.

Timing of Airport Complex Development

The precise date of opening TORONTO II for service is yet to be set. Present estimates are for it to be at or near 1980, and this has been assumed for this study. At that date, it is predicted that air passenger flow through Toronto will amount to about 12 million passengers per year (see Table A-1 in Appendix A). If TORONTO II is in existence at that time, it will be expected to accommodate two-

¹These parameters were determined through examinations of (1) data prepared in a study of Montreal Airport, (2) information reported in the MTARTS survey, and (3) information about employee residence patterns associated with the new large Ford Motor plant in Talbotville.

TABLE 5

SPATIAL DISTRIBUTION PARAMETERS FOR AIRPORT COMPLEX EMPLOYMENT

<u>LOCATIONAL PARAMETERS</u>						
	Employment	of jobs at Airport		of employees residing within		
		in Towns	-	20 Min. ²	30 Min.	+30 Min.
I. AIRPORT OPERATIONS JOBS	11,000	100%	-	N.A.	85%	15%
II. AIRPORT DEPENDENT JOBS	15,500					
(i) Maintenance/Service	7,200	47%	-	N.A.	85%	15%
(ii) Accommodation/Service	8,300	-	53%	50%	35%	15%
III. COMMUNITY INDUCED JOBS	21,000 ¹	-	100%	50%	35%	15%
	to 26,500					
IV. TOTAL AIRPORT COMPLEX JOBS	47,500	-	-	-	85%	15%
	to 53,000					

Notes:

1. Range results from different non-basic employment multipliers for different sites. See Col. 4, Table 4.
2. Applicable only to those persons employed off the airport and assumes within-town home-to-work trips.

thirds of the flow, according to present distribution plans. This means that TORONTO II could come into operation at a level nearly twice as great as Malton in 1968. (The level of operation of Malton at 1980 could be slightly lower than at present as international travel is allocated to TORONTO II; but Malton will continue to grow after that and could nearly double its present size by 1990.)

These estimates of air passenger flows are the basis of the forecasts of the size of the airport complex as shown in Table 4. At the projected 1980 level for TORONTO II there will be a demand for nearly 14,000 jobs in the Basic Complex and almost that many again in community induced activities. Translated into population terms this amounts to about 60,000 persons whose source of income will lie within the airport complex, and probably within the Impact Area. A doubling of the 1980 level can be expected by 1990 and a further doubling in the 1990-2000 decade, if the forecasted levels hold true.

Looked at in a slightly different way, this schedule means that by the end of the present decade we must construct the TORONTO II airport facility and set it in operation carrying twice the volume of the present Malton. We must then double that capacity every decade after that. It must be remembered that it is the whole complex which must proceed at this rate, not just the airport expansion. Transportation and utility services, housing and town-building

must keep pace. It should be expected that some lag might occur between the expansion of airport operations and the expansion of other components of the complex. No specific figure can be ascribed to this lag, but 2-4 years difference would seem reasonable. In any case, the schedule for the airport is essentially a schedule for urbanization, even if slightly later.

SITUATION OF THE AIRPORT IN THE REGION

The decision to find a site for TORONTO II in a relatively undeveloped locale upwards of 40 miles from the metropolitan core will have the effect of focusing most of the demands of the complex in the vicinity of the airport -- the Impact Area. Since this is, however, a regional airport for southern Ontario, it will still have substantial links with its passenger markets and the suppliers to the complex, both of which may be expected to be in the nearby metropolitan areas. Most notably these links will be in the form of transportation and utilities which could affect the pattern of regional growth depending upon the sector of the region in which they occur. Growth within the Impact Area which is selected might demand a change in the form of regional growth. Thus, the demands of TORONTO II will fall upon the region in two ways: (1) the quality and size of its service linkages, primarily for passengers and cargo; and (2) the location of the airport complex.

Regional Linkages

We know that the passenger servicing pattern of Malton Airport is comprised such that 70 per cent of the origins are from within Metropolitan Toronto while the remaining 30 per cent originate in other parts of Southern Ontario.¹ The four major areas of passenger generation outside of Metropolitan Toronto are: the Hamilton-Oakville-Cooksville area, the Kitchener-Waterloo-Guelph area, the Oshawa-Ajax area, and the Yonge Street Corridor.

These four non-Metro areas will likely continue as major sources of passengers for TORONTO II, and could possibly be even more prominent in the passenger origin pattern for TORONTO II for the following reasons. First, the new airport is to be dominated by international flights, which comprised only 40 per cent of Malton's pattern. Secondly, the McLeod study to which we referred, showed 44 per cent of Malton's international passengers to have origins outside Metropolitan Toronto.² With the continued high rate of growth in sectors west of Toronto in particular, the regional demand of TORONTO II will likely be exerted through linkages both to Metropolitan Toronto and to the metropolitan areas of Kitchener-Waterloo and Hamilton. Much smaller, but still significant links will exist with areas to the east and north of Toronto. Not to be overlooked are the vital links that will be needed between Malton

¹Murray G. McLeod, A Comprehensive Survey of Passengers Flying from Toronto International Airport, May-June 1968, Toronto, University of Toronto, Institute for Aerospace Studies, UTIAS Technical Note No. 141, August 1969, pp. 9.

²Ibid., p.p. 16.

and TORONTO II to facilitate the interchange of passengers and cargo.

It is necessary to move beyond this abstract notion of linkages and ask about the kind and quality of the linkages in order to appraise their demands on the region. For example, TORONTO II will require transportation connections of superior quality with the metropolitan transportation system. Given the present dispersed pattern of origins of passengers in the region and the unrestricted access to the present airport as a model for TORONTO II, a fairly accessible freeway link would be established. A rapid transit component might also be included which would have intermediate stations. This type of linkage with the airport would have the effect of conferring improved accessibility on an existing radial corridor (such as Highway 401 or Yonge Street North) or of helping to create a new one (such as Highway 7 or 10). There could then arise the demand for development along the line of improved ground transportation, particularly if trunk water and sewerage services to the airport followed this same line.

The demands on the region of the transportation links to TORONTO II would be significantly different, if access to the airport was channeled as in the "Blumenfeld concept" of the collector terminal. Under this idea, a master terminal would be established at a highly accessible location in the metropolitan transportation system in which would take place all normal passenger, baggage and customs

services. The passengers would then be transported on a very limited access route directly to the airport. This type of terminal might also serve Malton Airport; although service to Kitchener-Waterloo and Hamilton areas might require supplementary facilities. In any case, linkages to TORONTO II managed in this way would probably make little demand on the direction of the pattern of regional growth. These important alternatives are yet to be resolved.

Location of the Airport Complex

Wherever the TORONTO II airport is established in the region it will be a matter of establishing a growth centre. The airport will demand a substantial segment of regional population and urban growth, will implant it at the selected site, and will diffuse it throughout its Impact Area. But it will make a difference where the airport is located; does the airport growth fall upon an undeveloped part of the region with small prospects for growth? Or does it fall on an area which expects to enjoy continued fast growth? In either event, how will the choice of site affect the desired direction and pattern of regional growth?

Two of the sites have nearby cities of substantial size (Site B, Oshawa and Site C, Guelph/Kitchener-Waterloo) both of which will be able to absorb the demanded airport growth level and rate

fairly readily. A third site (Site A) is close to the fast-growing Yonge Corridor north of Toronto, although the latter sector has no large urban concentration at present. The remaining site (Site D) contains little development of any kind; its largest nearby centre is just under 6,000 population today, and its prospects are for not much more than doubling by 1990.

Location of the airport complex at Site D would, therefore, demand a much higher performance from the region than had been anticipated, as well as draining growth from some other part of the region. At Site A, the airport complex would probably assure the regional growth horizon for that area would be practicable. At Sites B and C, the airport complex might accelerate growth well beyond targeted levels and thereby drain off growth from other areas in the region. In short, the airport complex will demand a substantial segment of regional growth to be directed at a sector west, northwest, north, or east of the metropolitan core -- the demands for TORONTO II will significantly impinge on the regional growth strategy.

Having now raised the question of differences among the alternative sites for TORONTO II, we shall now turn to an examination of the demands on each of them for population, land use, capital, etc..

THE AIRPORT COMPLEX AT ALTERNATIVE SITES

The TORONTO II complex may be expected to exert demands on any of the alternative Impact Areas at much the same level and character. There are two modifying factors affecting demands of the complex. The first of these is the effect of concentrations of service activity in already established nearby cities, which will modify population and employment levels and, in turn, income and land use. The second is the relative ease of supplying trunk water and sewer lines, hydro service, and transportation access to the different sites, which will modify capital investment levels. Table 6 summarizes the gross demands of several important aspects of the TORONTO II complex.

TABLE 6
SUMMARY OF DEMANDS OF THE AIRPORT
COMPLEX AT ALTERNATIVE SITES, 1990

M E A S U R E S O F D E M A N D					
<u>SITES</u>	(1) <u>NEW POPULATION</u>	(2) <u>NEW EMPLOYMENT</u>	(3) <u>URBAN LAND NEEDS (ACRES)</u>	(4) <u>NEW CAPITAL STOCK (HIGH)</u>	(5) <u>INCOME FLOW (ANNUAL)</u>
				M I L L I O N S	
A.	142,500	53,500	9,541	\$2,852.5	\$585.8
B.	136,000	50,500	9,080	\$2,739.4	\$560.4
C.	128,000	47,500	8,553	\$2,658.0	\$530.0
D.	142,500	53,000	9,541	\$2,883.7	\$585.8
Maximum Difference	14,500	5,500	988	\$ 225.3	\$ 55.8

SOURCES: 1. See Table 7 4. See Table 9
 2. See Table 4 5. See Table 10
 3. See Table 8

The overview provided by Table 6 shows that while not the same level of demand is exerted at each site there are differences of only 11 percent between the highest and lowest demand levels in all cases. For example, the additional urban land needed if the airport complex were established at Site A would be just under 1,000 acres, or 11.5 percent more, than if established at Site C. Differences of this proportion exist in the other factors as well.

Another persistent feature among the array of demands on the alternative sites is the order in which the sites emerge. The demands are always greatest on Sites A and D, followed in turn by Site B and Site C. The persistence of this order is a reflection of the effect that nearby urban areas will have on reducing the amount of community induced employment in the complex. It is contended that, in areas like Guelph or Oshawa with tertiary sectors of substantial size the existing capacity will be used more intensively and not as many new jobs will be spawned in the service sector. Since employment estimates for the complex are used to derive all the other demand factors, their effects show throughout. Even in the capital stock requirements, where location differences intervene regarding servicing costs, the sites receiving the least demand for tertiary employment are also among the cheapest to supply with services. Table 4 and tables 7-10 give more elaborate derivations for the demand levels just reviewed.

Population and Employment

At each of the sites under study, establishment of TORONTO II would result in development of the total Basic Complex -- Airport Operations and Airport Dependent -- in the Impact Area. This amounts to 26,500 new jobs on and off the airport site and an associated population of nearly 70,000. Most of the latter will choose to live within the Impact Area, but some will live beyond this immediate impact zone. Differences in the amount of population to be accommodated in each Impact Area arise with regard to the Community Induced component of the complex.

In general, a 1 : 1 ratio with the Basic Complex has been used to determine the size of the community based employment.¹ A slightly smaller multiplier seemed more reasonable, however, for the two sites with already well-developed urban centres and services -- Sites B and C. Moreover, it was felt that Site C, in conjunction with the Guelph-Waterloo/Kitchener urban complex would take on more of the service functions from within its own tertiary sector than would Oshawa from Site B, (see Table 4 again). The resulting total populations which might be expected at each site by 1990 are given in Table 7. It should be noted that these population figures have not been "aged"; actual population will be higher if the new residents introduced into the area as the complex expands also grow in number. Precision cannot

¹Walter Isard and Stanislaw Czmanski, "Techniques for Estimating Local and Regional Multiplier Effects of Changes in the Level of Major Government Programs," Papers III, Peace Research Society Conference, 1965.

be given to such forecasts because of uncertain conditions affecting rates of natural increase, migration and the establishment of community service activities. Liberal estimates are given in the companion report of Canadian Urban Economics and they suggest Impact Area populations at 1990 being as much as one-fifth higher than those in Table 7.

TABLE 7

TOTAL POPULATION GENERATED
BY AIRPORT COMPLEX

N E W P O P U L A T I O N

<u>SITE</u>	(1) <u>TOTAL EMPLOYMENT</u>	(2) <u>TOTAL ASSOCIATED POPULATION</u>	(3) <u>IN IMPACT AREA</u>	(4) <u>OUTSIDE IMPACT AREA</u>
A.	53,000	142,500	121,500	21,000
B.	50,500	136,000	115,600	20,400
C.	47,500	128,000	109,200	18,800
D.	53,000	142,500	121,500	21,000

-
- NOTES:
1. See Table 4.
 2. Assumes Labour Force Participation Rate of 38%, therefore Pop. = 2.7 X column 1.
 - 3.
 4. Based on Location Parameters, See Table 5.

The locational parameters (Table 5) relating place of work to place of residence would establish most of the new population within the Impact Area, but not its exact location therein. And while we can assume that it will be urban-oriented, it is not possible to say whether the demand will fall upon existing centres, much less which ones, or upon completely new centres. A later section of this report suggests some compatible distributions of centres and population for the Impact Areas, but bringing them about will require control. (A consequence, or impact, of choosing a particular distribution will be the need for control, but that subject must be set aside for now.) However, it does seem reasonable to expect that where large and/or growing centres presently exist in an Impact Area they will attract the airport complex growth which occurs outside the noise lands. The following centres in their respective Impact Areas are most likely to assume this role:

SITE A -- Newmarket/Aurora

SITE B -- Oshawa, Bowmanville, Whitby

SITE C -- Guelph, Georgetown, Milton, Acton

SITE D -- Orangeville.

Two principles will probably act to distribute the demand. First, the fewer the centres, the more concentrated the demand will be. Second, the larger centres will acquire proportionately more of the growth. Another factor which would likely qualify the situation for an Impact Area is its present size and relation to the metropolitan core.

For Sites A and D, for example, their relatively small size may work against them obtaining the same share of Airport Dependent activities, such as hotels, as would the other sites. Many of these activities might not find it attractive to locate outside the metropolitan core, if Site A or D were the location of the airport facility.

Thus, there could be several modifying factors regarding the distribution of demand on population and employment between Impact Areas as well as within Impact Areas. These, in turn, would affect land use needs, capital requirements, and income flows.

Land Use Demands

Of the approximately 9-10,000 acres required for the urban development associated with the airport complex, over 95 percent will be for residential or residence-associated uses. The industrial land use component is noticeably small but, it must be remembered, the airport facility itself serves the same employment function for the Impact Area that industry does in "normal" communities. As mentioned earlier, not all persons associated with the airport complex will wish to reside in the Impact Area and a certain amount of the land use demand will have to be met in other communities. This could account for about 15 percent of total land demands (see Table 8).

The same qualifications which apply to the demand on population and employment also hold true for land use: first, the magnitude of difference between the most demanding and least demanding sites regarding land use is only just over 10 percent; second, differences between sites are due to differences in the levels of induced service employment in the Impact Areas. In addition, land use demands raise the question of "On whom do the demands fall?". Between 10-11 square miles of new residential development must be created in the next twenty years in order to accommodate the airport complex. Our present approaches to such development allow the burden to fall on the private residential sector and the local government sector. To produce urban development of the scale and at the

TABLE 8

LAND USE REQUIREMENTS OF THE AIRPORT COMPLEX, 1990¹
(acres)

	(1)	(2)	(3)	(4)	(5)	(6)
	<u>Industrial</u>	<u>Commercial Services & Miscellaneous</u>	<u>Residential</u>	<u>Open Space & Recreation</u>	<u>Sub- Total</u>	<u>Total</u>
A. (i) Noise Lands	188	4	-	-	192	9,541
(ii) Remainder of Impact Area	135	174	6,075	1,215	7,599	
(iii) Outside Impact Area	-	-	-	-	1,750	
B. (i) Noise Lands	188	4	-	-	192	9,080
(ii) Remainder of Impact Area	135	123	5,780	1,150	7,188	
(iii) Outside Impact Area	-	-	-	-	1,700	
C. (i) Noise Lands	188	4	-	-	192	8,553
(ii) Remainder of Impact Area	135	109	5,460	1,090	6,794	
(iii) Outside Impact Area	-	-	-	-	1,567	
D. (i) Noise Lands	188	4	-	-	192	9,541
(ii) Remainder of Impact Area	135	174	6,075	1,215	7,599	
(iii) Outside Impact Area	-	-	-	-	1,750	

NOTES: ¹Does not include airport facility.

rate indicated is something the latter two sectors have little experience with in Canada, except in our largest cities. The relatively undeveloped Impact Areas with their generally small centres mean that the demand will fall on small local governments to provide utilities, schools, welfare services, protective services, etc. as well as the routine zoning, subdivision control, and building regulations.

Capital Investment Needs

Of the nearly \$3 billion which will be required to be invested in the airport complex by 1990, only about one-quarter is needed to establish the airport facility and its transportation and utilities linkages. The remainder is needed to provide the community facilities and housing for the employees of the complex and their families. Up to 55 percent of the capital requirements will flow from the private sector and over two-thirds of this will be for housing. Of the approximately \$1.2 billion which will be demanded of the public sector, the Federal Government will be responsible for about one-half, primarily for the airport and noise lands. The remainder of the public capital investment must be provided by the Ontario Government (40 percent) and the local governments of the area (60 percent). Federal and Provincial capital components are vital to the initial opening of TORONTO II, nominally 1980. Local government capital investment and private investment will be demanded

TABLE 9
CAPITAL INVESTMENT STOCKS
FOR AIRPORT COMPLEX

(1969 Dollars)

<u>Site</u>	(1) Airport Terminal Noise Lands	(2) Airport Dependent Industry	(3) Community Induced Industry And Services	(4) Residential Infrastructure (millions of dollars)	(5) Residential Construction (millions of dollars)	(6) Water and Sewer (High)	(7) Main Hydro Lines	(8) Highway and Transit	(9) Total Capital Stock
A.	600	371.1	162.8	400.8	1,155.4	49.6	2.8	110	2,852.5
B.	600	371.1	147.4	382.5	1,102.7	33.2	2.5	100	2,739.4
C.	600	371.1	129.0	360.0	1,037.8	55.1	15.0	90	2,658.0
D.	600	371.1	162.8	400.8	1,155.4	63.2	9.6	125	2,883.7
									<u>Average</u>
									2,783.3

- Notes:
- (1) From data supplied by Federal DOT.
 - (2) From per-industrial worker investment of \$23,940; supplied by Economic Analysis Branch.
 - (3) sum total of all community induced (i.e., non-basic) jobs.
 - (4) From data supplied by Economic Analysis Branch: \$10,687 per household.
 - (5) Population ÷ 3.7 persons/household X \$30,000 per household.
 - (6) From threshold analysis by W. Strok & Associates.
 - (7) From Generation and Transmission Planning Section, HEPC.
 - (8) From DeLeuw Cather & Company Limited.

as the airport accelerates to full-scale operations in the late 1980's. Table 9 indicates the scale of capital needs for each site.

As with other factors, differences between sites regarding the demand for capital stock are slight, indeed less than seven percent separate the most demanding and the least demanding sites. The important difference between sites, again, would seem to be the capability of the local governments in the Impact Area to mobilize the necessary capital for the urban infrastructure and to provide the needed facilities when required.

Annual Income Flows

By 1990, the airport complex will generate an annual flow of income of between \$530-585 million, depending upon the site (see Table 10). Sites A and D will receive the highest income flows due to their larger employment in the community induced sector. The other two sites are lower, but by no more than 10 percent at the most. Indeed, Sites B and C would probably achieve the same income flows indirectly through the more intense use of their existing tertiary activities.

TABLE 10

ANNUAL INCOME FLOW GENERATED BY THE
AIRPORT AT ALTERNATIVE SITES, 1990.

M I L L I O N S , 1 9 6 9 D O L L A R S				
SITE	(1) AIRPORT OPERATIONS	(2) AIRPORT DEPENDENT	(3) COMMUNITY INDUCED	(4) TOTAL INCOME FLOW
A.	129.6	187.5	268.7	585.8
B.	129.6	187.5	234.4	560.4
C.	129.6	187.5	212.9	530.0
D.	129.6	187.5	268.7	585.8

NOTES: 1969 incomes have been expanded by an average annual of 2.25 percent to 1990 to account for annual productivity improvement (i.e. a multiplier of 1.56).

Assumed 1969 Wage levels:

- Col. (1) \$7,550 for all jobs
- (2) \$9,000 for 6,400 jobs
- \$7,350 for 9,100 jobs
- (3) \$6,500 for all jobs

PART TWO

RESPONSES TO THE DEMAND

THE IMPACT OF TORONTO II

IMPACT ON REGIONAL GROWTH

There are three major ways in which the establishment of the TORONTO II airport and its complex could affect economic development of the region: (1) It could serve to generate expansion of the region beyond its own contribution of jobs, investment, etc. That is, it could have a "multiplier effect". (2) It could intensify, or speed up, the pace of development through its needs for capital or labor. It could, thus, have an "accelerator effect". (3) It could change the structure of economic development through its introduction of new population or labor force components into the region: it could "transform" the region's development.

The five factors through which we have viewed demands of TORONTO II on the region -- population, employment, land use, capital and income -- will be used to examine what response there will be to TORONTO II. Each of these factors will be examined in light of the three effects that are possible -- multiplier, accelerator, transformation. A summary of the effects on the five factors is given in Table 11.

TABLE 11

SUMMARY OF IMPACT OF TORONTO II ON
ECONOMIC DEVELOPMENT OF TORONTO REGION

MAJOR FACTORS IN REGIONAL DEVELOPMENT	TORONTO II'S EFFECT ON REGIONAL DEVELOPMENT		
	MULTIPLIES	ACCELERATES	TRANSFORMS
1. Population	NO	NO	NO
2. Employment	NO	MODERATELY	NO
3. Capital Investment	NO	STRONGLY	POSSIBLY
4. Income Flow	NO	MODERATELY	NO
5. Land Development	NO	MODERATELY	POSSIBLY

Population Growth

The effect of TORONTO II on the population growth of the region can be grasped by comparing the approximately 140,000 persons expected to be associated with the airport complex to the yearly population increment of 90,000 expected in the region by 1990.¹ The latter rate of population growth is expected as a result of the combination of many dynamic factors in the region's development, not just the establishment of a new airport. Thus, the airport complex will not act as a "multiplier" on regional population. Nor should it be expected to be an "accelerator" of regional population growth, because even now the region is adding 79,000 persons per year. The composition of population which will be associated with the airport complex would seem to be consistent with the present regional composition and, therefore, would have little effect on population growth.²

Employment

Just as the regional population has established a high growth rate, so too has employment growth. Thus, in the twenty years to 1990, the number of jobs created as a result of TORONTO II (about 50,000) will be about the same as a single year's increment of new jobs. The airport itself has a multiplier effect on employment within the

¹From forecasts prepared by the Economic Analysis Branch, Department of Treasury and Economics, December 30, 1969.

²Gerald Hodge and Jacques D. Paris, "Population Growth and Regional Development", in Demography and Educational Planning, Betty MacLeod, ed., Toronto, Ontario Institute of Studies in Education, (Forthcoming 1970)

complex and, hence, on sectors represented in that complex such as the hotel, personal services, and community services industries. However, since expansion of airport facilities was inevitable for this region, as witness the present plans for expansion at Malton, the employment growth associated with Toronto II is not a result of Toronto II alone.

Some speculation has existed regarding the multiplier effect of a new international airport on the aircraft and aerospace industries. That such industries will be attracted to the region because of TORONTO II providing either a component of production or an external economy to a firm must be dispelled. There are a number of reasons for this: first, much of this industry is in component parts, such as Douglas Aircraft in Toronto, which does not require runway or other airport facilities in its production; second, where aircraft testing is required, the industry usually does not need an international level airport facility, as for example, Canadair in Montreal and DeHaviland in Toronto; third, and a converse of the second, large international airports with many commercial flights do not like to tolerate random flight patterns of aircraft testing, etc. The aviation industry may grow in the region in the future, not because TORONTO II aids it directly but because TORONTO II will add to the sophisticated infrastructure of the region and, thus, add to its overall attractiveness to industry.

There could be a slight "accelerator effect" on the demand for labor in the region due to TORONTO II, because of its scale and timing. The likely opening date for TORONTO II is 1980. At that date, over 10,000 jobs will be created in the basic complex as well as that many again in communities accommodating airport employees. This is analogous to growing an airport complex twice the size of Malton by the end of this decade. In addition, the construction phase, which could take four years and involve \$600 million in airport facilities, utilities, and transportation, will also place a great demand on labor. The construction labor force could number 1,500-2,000 throughout the 1975-1980 period. This, of course, is exclusive of the urban construction in residential, commercial and public facilities. The equivalent of building a city for 50,000 people must be accomplished in the Impact Area by the early 1980's, and double that again in another decade. The urban building will amount to nearly \$2 billion by 1990 and probably require a construction labor force of up to 2,000 almost constantly up to that time.

Finally, there are no special characteristics of the labor force associated with the airport complex. There will likely be no effect on the structure of the regional labor force as a result of TORONTO II.

Capital Investment

Within the context of the dynamic Ontario economy, with its

expected long-term expansion of Gross Provincial Product of 6.2 percent annually, the investment represented by TORONTO II will not have a significant impact. The nearly \$3 billion to be invested in capital stock of TORONTO II and its complex up to 1990 will be complemented in the region by other capital investment many times over that value. But while there would seem to be little regional multiplier effect in the investment in TORONTO II, there could be a strong accelerator effect. This would be due mainly to the scale of capital that must be brought to bear (about \$1.5 billion) at a relatively early date in the future (by about 1980) in a relatively limited locale.

There is also the possibility that some transformation could occur in the capital investment pattern in the region because of TORONTO II. The pace and volume of public investment in residential infrastructure and urban trunk water and sewerage systems and transportation will place a crushing financial burden on local governments in the Impact Area, if, as usual, that level of government must provide such capital stock. "Forced" development of this sort often suffers lags in timing with resulting strains and costs on participating sectors. Small local governments are particularly vulnerable to such problems. Even the private sector might not be able to respond at the requisite pace in some areas.

Provincial involvement might, thus, be required in other than

its normal sectors of investment. This, in turn, could affect the pattern of provincial capital investment for a considerable time as well as its functional allocations. The proposal for a new city at the burgeoning Lake Erie industrial complex, proposed in the Haldimand-Norfolk Study, brings this issue into sharp focus.¹ The latter new urban development is slated for operation at the same time as TORONTO II. Guidelines and priorities for using provincial financial resources in these two coincident situations, and possibly others, will surely have to be found.

Income Flow

TORONTO II will not stimulate any special income flow in the region beyond that resulting from its own activities. The reasons for this are as outlined for the previous factors. A moderate acceleration affect might occur, however, depending upon the pace of development of TORONTO II. Income generated through construction would be most affected in this way. Again, there is no special structure to the income flow from the airport complex which could change the pattern of regional development.

Land Development

Over 90,000 acres of land in the region will be affected directly by the establishment of TORONTO II, including both noise

¹"Towards a Land Use Plan for Haldimand-Norfolk", Ontario Department of Municipal Affairs, March 1970.

lands and urban development. No overall expansion in the region's economy will be caused by this vast amount of land being consumed, but the fact that it will have to be largely acquired by 1980 could accelerate regional land development in the last half of the 1970's. Ordinarily, 90,000 acres could accommodate about 1,000,000 people or one-third of the region's growth to the end of the century. Since only about 10 percent of the lands of the airport complex will be occupied by permanent population, the land acquisition has the effect of using nearly 30 percent more land for "urban" purposes in the region than required by normal population growth.

No change in the structure of economic development for the region should result from the advent of TORONTO II. But there is the distinct possibility that the pattern and direction of regional growth could be altered by the location chosen for the airport complex. Not only could it be an attractive force within the region, but it will also serve to strengthen ties to the peripheral region to which it is oriented. A location to the west would favor the traditional growth orientation of the Toronto region as well as link it to another fast-growing region centred on Kitchener-Waterloo. Located in other directions from Toronto, the airport complex will not have the support of regional growth patterns of such strength and the peripheral regions are not as dynamic. In terms of economic development, a western site might have a stronger cumulative effect on regional growth than

sites in other directions. But sites to the east and north open possibilities of development inside and outside the region that may be both substantial and more easily accomplished with a major linkage such as TORONTO II.

IMPACT ON REGIONAL PATTERNS AND POLICY

While the presence of TORONTO II may not have a dramatic impact on the region's economic structure, it will have a strong impact on the spatial structure depending upon where it is located in the region. There are three ways in which the impact on spatial relations might be rendered: (1) through linkages to passenger markets and to suppliers of the complex; (2) as a function of the nature of the existing and anticipated development in the affected part of the region; and (3) by the strategic considerations the site has for inter- as well as intra-regional relations. Table 12 summarizes the impact on spatial aspects of the region: "regional patterns" encompasses the first and second categories above and "regional policy" the third. Figure 3 portrays these same impacts.

Throughout this section we will be able to talk only about "possible" impact. Two indeterminate factors require this limitation. The first is the nature of the terminal facilities for TORONTO II (will a collector terminal, à la Blumenfeld, or a dispersed pattern of passenger origins, as at present, be employed?). The second is the absence of any public policy statement on the desired direction of development in the region to ask how it might be affected.

TABLE 12
SUMMARY OF POSSIBLE IMPACT ON
REGIONAL PATTERNS AND POLICY OF TORONTO II

AIRPORT LOCATION	POSSIBLE IMPACT ON	
	REGIONAL PATTERN	REGIONAL POLICY
Site A.	- Reinforces the "development corridor" on North Yonge; reduces Lake Simcoe recreation area; coincides with Aurora/Newmarket growth nodes.	- Promotes growth toward North Simcoe and enhances accessibility of latter region; water resources of Lake Simcoe will come into contention; conflicts between agriculture, recreation, Indian Reserve and the airport complex.
Site B.	- Reinforces the "development corridor" on 401 east; coincides with growth tendencies of Oshawa node.	- Gives a development thrust toward Lake Ontario Region through Port Hope-Cobourg; areas to west of Toronto have airport accessibility reduced.
Site C.	- Could create another "development corridor" along Highway 7 west parallel to the Lakeshore; many small centres could dissipate growth; Niagara Escarpment could be affected.	- Reinforces the already established growth of the Kitchener-Waterloo area; associated urban development east of the site could be difficult to control.
Site D.	- Would divert some regional population growth to under-developed sector; could spawn a "development corridor" on Highway 10 north; Niagara Escarpment could be affected.	- Creates a strong northwest node to foster links with Georgian Bay and the south; linking of Kitchener area with North Simcoe would be facilitated; large-scale development will require substantial planning and guidance.

Possible Impact on the Regional Pattern

The effect on the region will be discussed with regard to TORONTO II being located at each of the sites in turn. It has been assumed that TORONTO II will draw its passengers from dispersed locations. In this way, the most demanding situation for airport linkages will be stressed. The use of collector terminals in the nearby metropolitan core areas would minimize this type of impact.

It is further assumed that the future passenger markets for TORONTO II be dominated by those areas indicated on Figure 3: Metropolitan Toronto; Oshawa/Ajax/Whitby; Cooksville/Oakville/Hamilton; North Yonge; and Kitchener/Waterloo. Those areas outside Metropolitan Toronto will increase their share of the passenger market, in particular the western lakeshore corridor to Hamilton and Kitchener/Waterloo.

SITE A: This site is located at the head of an existing corridor of development -- North Yonge -- extending through Thornhill, Richmond Hill to Aurora and Newmarket. The improved highway access which will have to be provided to the airport facility, and the water and sewerage needed for the new urbanization in the Impact Area could strongly reinforce this corridor. Areas along it not presently considered for development could be drawn into its influence thus causing a secondary effect on the demand for new services. To the extent that development of the airport complex could be directed at the Aurora/New-



market area, growth could be facilitated and undue sprawl eliminated.

Three other facets of the area affected by an airport complex at Site A are the extensive recreation and cottage areas along the shores of Lake Simcoe, the prosperous agricultural area in the Holland Marsh, and the Georgina Island Indian Reserve. Each of these are unique to the region. The number of people in cottage areas within the noise lands has been estimated at 18,000.¹ Since many cottages have multiple occupancy during a summer, the actual number of people cottaging within the noise lands is likely to be much higher than this estimate. If these cottagers are displaced from the Impact Area, their demand for cottages will have to be accommodated elsewhere in the region, a not too likely prospect. The farming conditions in the Holland Marsh cannot be replaced elsewhere in the region. If displaced by development from the airport complex, this resource would be irrevocably lost to the region. Nearly half of Georgina Island falls within the noise lands; it seems extremely questionable whether lands held in trust for Indian people should be thus violated. The issue here is not a simple one of replacing the land of the reserve acre-for-acre with land somewhere else; cultural heritage is involved.

SITE B: This site also falls near an existing development corridor extending east from Metropolitan Toronto through Pickering, Ajax, Whitby, Oshawa, and Bowmanville. The development accompanying the airport

¹From Project Planning Associates Ltd., January 1970.

complex would reinforce this corridor. Lying as it does just north of Oshawa, it would require only Highway "spurs". New urban development could probably be easily directed to new or existing centres. With the pattern of regional growth already favoring Oshawa, an airport at Site B merely confirms it and helps to assure it.

SITE C: This site is on the eastern fringe of the fast-urbanizing Kitchener-Waterloo-Guelph-Galt region. It lies astride Highway 7, considerably north of the 401-Lakeshore corridor of development. These two factors could combine with the pressure for airport development to help create a new corridor for development along Highway 7. There are several dynamic centres along this route; Georgetown, Acton, Milton. In turn, growth from the airport might be dissipated among these several centres as well as in isolated subdivisions, thus setting in motion disparate demands for utilities and transportation. Control over Niagara Escarpment recreation areas would be difficult if the latter dispersion occurred.

SITE D: This site falls in a relatively undeveloped sector of the region and one which is not likely to receive much development over the next two decades. An airport at this site would be a significant stimulus for the sector's development. The impact of this would be to divert population, jobs, and urban development from other parts of the region to the Impact Area. The highway access that would be necessary to link Site D with the main passenger market areas could

engender a development corridor northward from Brampton along Highway 10. This Caledon area is notably difficult and expensive to service for large-scale urbanization. Key sections of the proposed Niagara Escarpment Parks System are within or adjacent to this Impact Area;¹ uncontrolled development could jeopardize the concept for the whole region.

* * * * *

In summary, Site B as a location for TORONTO II would have the least impact on the regional pattern: present growth tendencies in the Oshawa area would be sustained and enhanced. The remaining sites each might affect the regional pattern in significant but unique ways. Site D would stimulate development in a sector not likely to be developed under normal conditions. Site C could promote a new corridor of development and/or prove difficult to control among many competing centres. Site A would enhance an existing corridor which, in turn, could jeopardize the Holland Marsh. The latter site also would remove a substantial portion of recreation and cottaging land from the region's resources.

Possible Impact on Regional Policy

The four sites that are being considered for TORONTO II are located at the outer extent of the present "commutershed" for the metropolitan region. The establishment of TORONTO II will thus mean the establishment of a "growth centre" on the periphery between

¹Ontario, Dept. of Treasury and Economics, The Niagara Escarpment Study, Toronto, June, 1968.

the Toronto Region and adjacent regions.. This will have a different strategic importance for inter-regional policy, depending on the particular site. The policy implications of some matters already raised about development within the region affected by TORONTO II will also be considered. Again, we may refer to Table 12 and Figure 3.

SITE A: This site and its associated development would promote growth toward the North Simcoe region of Barrie and Midland. The travel time from North Simcoe to a major airport would be nearly halved. The water resource of Lake Simcoe, shared between the two regions, is a key element in the possible development of the airport complex at Site A. The best use of this resource will have to be determined with inter-regional development in mind. Within the region, the main policy concerns regarding this site are the conflicts with agriculture, recreation and Indian Reserve lands.

SITE B: Growth of the Toronto Region tends to be westward and has not proceeded much beyond Oshawa to the east. Little or no integration of development has occurred with the Lake Ontario Region, adding to the latter region's isolation. With TORONTO II located at Site B, a strong development thrust would be given toward Port Hope and Cobourg and also enhance the accessibility of other parts of the Lake Ontario Region. Peterborough's travel time to a major airport would be more than halved and Belleville's almost halved. Conversely, the fastest growing passenger markets are west of Toronto and their accessibility

to the new airport would be reduced. Terminal planning and connecting transportation may be the key to resolving the latter problem.

SITE C: This site is situated between the fast-growing Kitchener-Waterloo region and the outward-thrusting Toronto Region. If development of the airport complex occurs to the west, it could help in rationalizing the pattern of growth in the former region. If the development occurs to the east, it could set up competing demands for services away from the lakeshore, it could make the Niagara Escarpment Parks plan difficult to attain, and it could alienate good agricultural land.

SITE D: An airport complex at Site D could serve as an important "fulcrum" between several regions whose integration might otherwise prove difficult to achieve. First, it would create a strong node on the northwest periphery of the Toronto Region which could foster connections with the region beyond -- Owen Sound, Collingwood, Bruce Peninsula -- for production and recreation activities. Second, because it must be linked firmly with the Kitchener-Waterloo area for passenger service, links beyond to Barrie and Midland could facilitate establishment of connections between western and northern Ontario.

Since Site D's Impact Area is also the least developed of the four under consideration, the establishment of the airport complex of the size envisioned in the time expected will demand substantial central guidance and planning. An important impact on regional policy will thus

be the formulation of a suitable institutional framework to accomplish such large-scale projects in the most desirable manner.

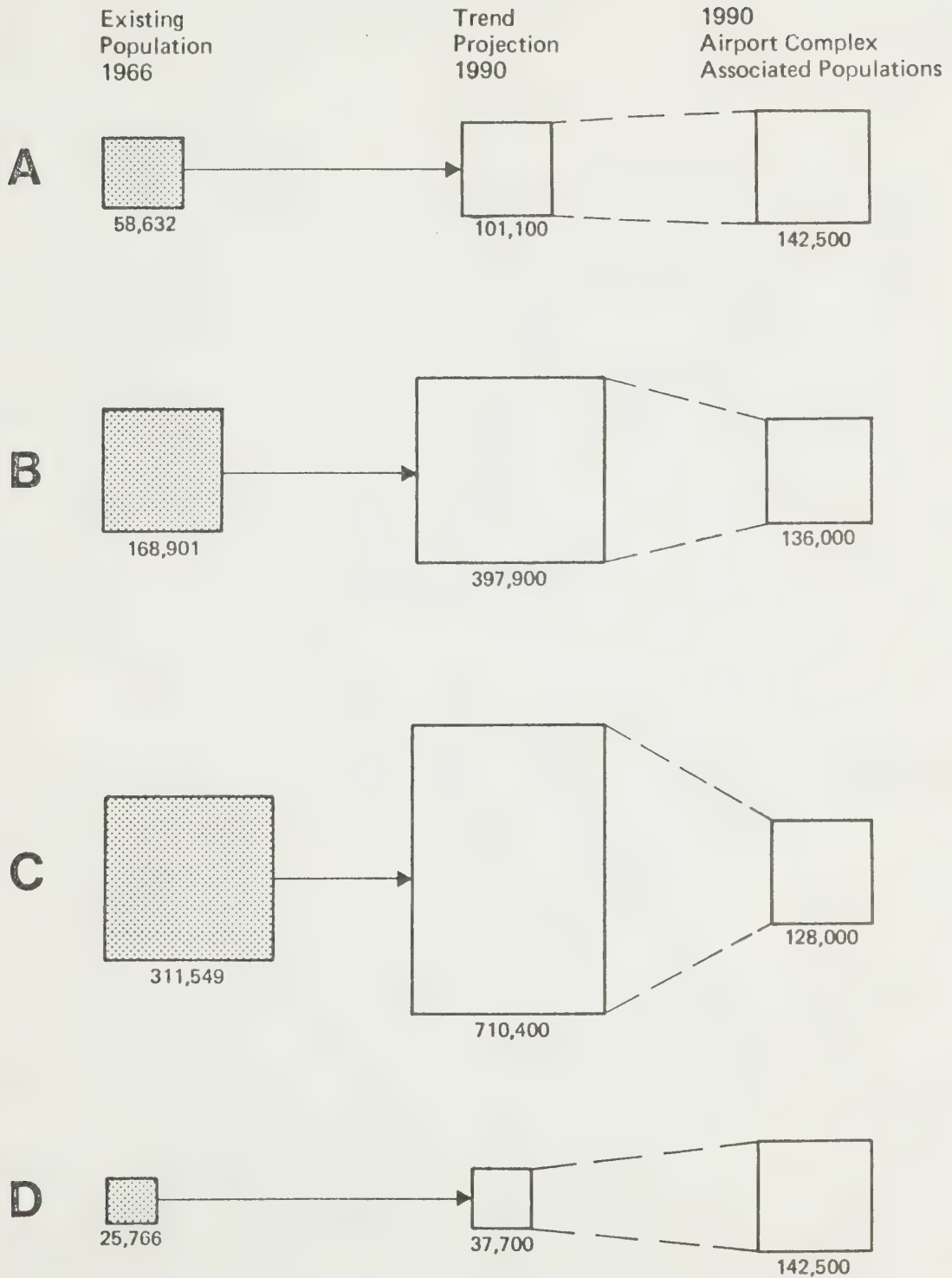
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Summarizing the impact on regional policy, Site B again emerges as the least demanding. That is, it will require fewer policy issues to be resolved and of those demanding attention few will be difficult to resolve. Site A, on the other hand, is the most demanding in its policy implications; Sites C and D fall between the extremes. More than anything else in Site D, attaining the resolve to carry out the development will be the most difficult. In Site C, the need for policies to restrain development will be the major requirement.

IMPACT ON LOCAL AREAS

Our consideration of impact of TORONTO II has been narrowing to differences between sites. In this section, the impact on the local area is examined. The impact is viewed through the demands made on population, land use, income, and capital investment. The approach is to see the impact of TORONTO II in terms of what might exist in the Impact Area without the presence of the airport. Thus, present conditions of population, land use, etc. and the growth in these factors are extrapolated to give a 1990 level of "normal" development. The development expected to be associated with the airport complex at 1990 is then compared with this.

Fig. 4 **IMPACT AREA POPULATIONS**
1966-1990



Local Population Impact

Each of the Impact Areas differ from one another in their population growth potential. Indeed, Site D in 1990 would still have almost 20 times less population than Site C in the Kitchener-Waterloo context. The airport complex population imposed on these areas also shows markedly different impacts (see Table 13). For Sites B and C, the airport complex would generate only one-fifth or one-third, respectively, of the population they might normally expect by 1990. While for Site D, the airport-generated population would represent a fourfold increase over the anticipated 1990 population.

The index of "relative population impact" is useful in two ways. First, a high index value suggests that Toronto II will have a "multiplier effect" on local population growth. A low index value suggests that the airport-generated population may not have any noticeable effect on local population levels in 1990. Second, and the converse of the first, is that a low relative impact means a greater ease with which the local area can absorb the new airport growth. Sites B and C, therefore, would seem to have less difficulty in accommodating airport growth because their size suggests the presence of a wide array of activities and institutions geared to handle growth situations. Site D might experience the most difficulty in this regard.

A slightly different way of appraising differences in impact on

TABLE 13

Relative Impact of Airport Complex
Population on Impact Areas, 1990.

Impact Area	(1) "Normal" Population 1990	(2) Airport Complex Population	(3) Relative Population Impact
Site A	101,100	142,500	1.41
B	397,900	136,000	0.34
C	710,410	128,000	0.18
D	37,700	142,500	3.78

Notes: (1) See report of Canadian Urban Economics and Table 3, Appendix B.
(2) See Table 6
(3) Col. 2
Col. 1

TABLE 14

Population Affected In Noise Lands At
Alternative Sites, 1966.

Impact Area	1966 Population		
	Urban	Rural	Total
Site A	3,458	1,956	5,414 ¹
B	2,089	2,667	4,756
C	2,546	3,005	5,551
D	1,389	2,568	3,957

Notes: ¹Summer population of approximately 18,000 has not been included.

Source: Project Planners and Associates

local populations of TORONTO II is to array the numbers of people who presently occupy the noise lands and who, presumably, will be displaced. Table 14 shows Site D to have the fewest indigenous population affected; Site C has the most year-round residents located in the noise lands. But Site A would affect most people, if summer population were included.

Local Land Use Impact

While adding only about 140,000 people to an Impact Area (which would require only 15 square miles for urban development), the airport complex will also require up to 130 square miles to be effectively "sterilized" for normal urban development in the noise lands. There are differences between airport sites due to water area that is involved. These land use demands are listed in Table 15 along with "normal" land use in 1990 due to growth in present-day population (as presented in Table 13).

Sites B and C, again, achieve the lowest relative impact because of the large growth they can already anticipate. However, with this index the implication is for a multiplier effect in all cases by about 85 percent of the magnitude of the index. That is, wherever the airport is sited, extensive noise land areas will be required. Site D would experience an almost-thirty times increase in land use; and Site A an almost-eight times growth.

Tests have been carried out to determine the relative costs of servicing the new urban areas generated by the airport complex at each

TABLE 15

RELATIVE IMPACT OF AIRPORT COMPLEX
LAND USE NEEDS ON IMPACT AREAS, 1990

<u>Impact Area</u>	(1) "Normal" Land Use 1990 (a c r e s)	(2) Airport Complex Land Use	(3) Relative Land Use Impact
Site A	8,400	66,700	7.9
B	33,100	82,700	2.5
C	59,200	91,300	1.5
D	3,100	92,300	29.8

Notes: (1) Assumes 12 persons/gross acre for 1990 population.
 (2) Column 6 of Table 8, plus total Noise Lands (water area of Noise Lands are excluded).
 (3) Col. 2
Col. 1

TABLE 16

COST OF SUPPLYING MAIN UTILITIES AND
ROADS TO AIRPORT COMPLEX POPULATION, 1990
 (1969 Current Dollars)

<u>Impact Area</u>	<u>Total¹ Cost</u>	<u>Per² Capita Cost</u>
Site A	91,042,000	725
B	68,621,000	547
C	105,535,000	843
D	80,517,000	643

Notes: ¹Costs are for least-cost combination of urban centres in Impact Area.

²Assumes 125,000 population to be accommodated.

Source: Threshold Analysis of Sites, W. Strok and Associates, Toronto.

impact area. Different population distributions were arrayed and per capita servicing costs for water, sewerage and roads were calculated. They are shown in Table 16. Site B would be the least costly Impact Area to service and Site C the most costly. Site D can achieve the second lowest per capita costs for servicing. The highest cost Impact Area is about 55 percent greater than the lowest cost Impact Area.

Local Capital Investment Impact

The development of the airport complex will involve nearly \$3 billion in capital investment by 1990. The relative impact of this amount of investment in the different Impact Areas is about the same as that for population alone. Site D would show the largest relative upgrading of capital stock, Site A would follow, and Sites C and B would show the least effect of the new investment. On a per capita basis the picture of impact of capital investment is different again (see Table 17). Although in all cases the investment per capita of the airport complex is about one-third higher than for the investment which could be expected under normal circumstances, the differences between sites are negligible.

Local Income Impact

The annual flow of income in the Impact Area attributable to the airport complex will be over \$500 million. Table 18-A compares this with

TABLE 17

RELATIVE IMPACT OF AIRPORT COMPLEX
CAPITAL INVESTMENT ON IMPACT AREAS, 1990

IMPACT AREA	(1) "NORMAL" CAPITAL INVESTMENT PER CAPITA	(2) AIRPORT COMPLEX CAPITAL INVESTMENT PER CAPITA	(3) RELATIVE CAPITAL IMPACT
1 9 6 9 C U R R E N T D O L L A R S			
Site A	14,956	19,958	1.33
Site B	14,943	20,108	1.35
Site C	15,223	20,731	1.36
Site D	15,114	20,268	1.34

NOTES: (1) Col. 2 - 6 on Table 9 , Re: 1990 population.
 (2) See Table
 (3) $\frac{\text{Col. 2}}{\text{Col. 1}}$

the income flow for the "normal" population in the area at 1990. Relative differences are similar in array to those for population, but are slightly higher because of the higher average incomes associated with employment in the airport complex. The relative impact on income would be highest in Site D's Impact Area and next highest for Site A. These two sites would experience a considerable multiplier effect for their area. The impact on income in the other two Impact Areas would probably be quite small, if any.

Looked at in per capita terms, Site D would also enjoy the greatest impact. Or, in this case, it would enjoy the greatest improvement in per capita income. Sites C and B follow in that order; while Site A which already has the highest incomes among the four sites would improve least (see Table 18-B).

* * * * *

In terms of relative impact, the effect of TORONTO II will be greatest on the Impact Area surrounding Site D. In population growth, land development, capital investment and income flow the amount generated by the establishment of TORONTO II would vastly overshadow what exists there now and what can be expected in the future. This same volume of population, etc., (i.e., the absolute impact) will not be as significant at the other sites, although at Site A the impact of TORONTO II will also be greater than "normal" development would generate. The other

TABLE 18

Relative Impact of Airport Complex Annual
Income Flow for Impact Areas 1990

A:

<u>Impact Area</u>	(1) "Normal" Annual Income Flow (Millions, 1969 current dollars)	(2) Airport Complex Income Flow	(3) Relative Total Income Impact
Site A	352.9	585.8	1.66
B	1,360.0	560.4	0.41
C	2,356.4	530.0	0.22
D	111.4	585.8	5.26

Relative Impact of Airport Complex Income
Flow per Capita for Impact Areas, 1990

B:

<u>Impact Area</u>	(1) "Normal" Income Per Capita	(2) Airport Complex Income/Capita	(3) Relative Income/Capita Impact
Site A	3,491	4,110	1.18
B	3,418	4,120	1.21
C	3,317	4,140	1.25
D	2,955	4,110	1.39

Notes: (1) From 1966 average per capita earnings for representative centres in Impact Areas; see Appendix B, Table 1 -- Column 3 x 1.56.
 (2) See Table 10
 (3) Col. 2
 Col. 1

two sites, both in the context of vital local economies, will generate far more on their own than TORONTO II would bring.

But it should be noted that a high relative impact may be a "mixed blessing" for an area. The small relative size of present development may portend difficulties in establishing such a large project as TORONTO II. Low relative impact implies greater ease in absorbing airport growth. Some additional facets of this problem are discussed in the concluding section of this report.

TORONTO II AS AN EFFORT IN LARGE SCALE URBAN DEVELOPMENT

Nearly three-quarters of the investment that will be made in the airport complex we have called TORONTO II will be made in urban development to accommodate about 140,000 persons by 1990, the scale of another Kitchener-Waterloo. Furthermore, the alternative locations being considered are well beyond present metropolitan suburban areas. The urban development associated with TORONTO II literally involves building one or more new cities (including adding substantially to existing centres). Accommodating urban growth in this way involves a number of real costs not present in suburban or inner-city development.¹ Five of these "extra" costs of new, large-scale urban development are identified in Table 19 and their relative impact on each of the sites is indicated because, as we already have seen, there are significant differences between the four sites.

¹Anthony Downs, "Alternative Forms of Future Urban Growth in the United States," Journal of the American Institute of Planners, XXXVI, January, 1970, - 11.

TABLE 19

Relative Costs of New, Large-Scale
Urban Growth by Impact Area

TYPES OF "EXTRA" COSTS	IMPACT AREAS			
	A	B	C	D
1. The <u>initial</u> cost of operation of facilities that must be built for capacity of future populations (roads, sewers, schools, etc.)	Highest	Medium	Lowest	Highest
2. The <u>total</u> cost of duplicating urban elements already existing in nearby urban areas (libraries, public buildings, museums, theatres, transit, etc.)	Medium	Medium	Medium	Highest
3. The higher cost of occupying new structures (housing, commercial premises, etc.)	Highest	Medium	Medium	Highest
4. The cost of overcoming obstacles created by small and/or fragmented government institutions (municipal government school boards, planning boards, etc.) in time lags, interest on capital, and congestion.	Medium	Medium	Medium	Highest
5. The cost of competition for labor force.	Highest	Lowest	Medium	Lowest

¹See Anthony Downs, "Alternative Forms of Future Urban Growth in the United States" Journal of the American Institute of Planners, Jan. 1970, and Gerald Breese et al, The Impact of Large Installations on Nearby Areas, Sage Publications, Los Angeles, 1965.

1. The Initial Cost of Building-In Future Capacity:

In building new cities or greatly expanding existing ones, facilities will often have to be built with capacity to handle a large population long before that population arrives. The cost here is either the loss or return on their initial under-utilization, or initial inefficient operation. This may occur for roads, water and sewerage systems, schools and hospitals in the public sector, while the private sector may also incur such costs in the building of shopping centres and industrial plants.

Those Impact Areas which have the least amount of urban development will suffer most from having to provide many new high capacity facilities: Sites A and D would have a higher incidence of these costs. Sites B and C, each having centres of substantial size nearby, would possess some existing capacity in such facilities and thus ease such costs.

2. The Cost of Duplicating Urban Facilities: Facilities in metropolitan areas such as museums, libraries, theatres and transit systems usually possess excess capacity that could be used to serve many more people. But with growth occurring too far from central cities for existing facilities to be used by the new population, new units will be required. The costs will be the total costs of duplication.

Again, those impact areas with little urban development and least accessibility to the metropolitan centre will incur more of these

costs. Site D will have to provide more new urban facilities; Sites A, B and C would have the advantage of such facilities being reasonably accessible, if not actually possessing the facilities.

3. The Cost of Occupying all New Structures:

In new cities, everything is brand-new: business firms, households, and institutions all have to occupy new quarters. No "filtering down" is possible in housing, offices, or factory buildings, etc. unless an inventory of older quarters already exists. Many low-income households and low-cost businesses, which are an inevitable and necessary part of large urban concentrations, could not survive without some form of subsidy to cover their higher costs of quarters. Many jobs associated with the airport complex will not be high paying, such as those in the passenger services group (hotels, restaurants) and in some community services; many small firms will be needed in the community service sector. They will require space at a price they can afford.

None of the Impact Areas provide much of a ready inventory of older quarters. To the extent that any relief of these costs is possible in any of the areas, it could come for Sites B and C which each have a large urban concentration (Oshawa and Kitchener, respectively) nearby, but then higher commuting costs will be incurred as a result.

4. The Cost of Mobilizing Small Institutions: Urban development in previously undeveloped areas encounters local government and other social institutions which are often unsophisticated and/or possess meagre resources. The task of building a large, new urban complex in a hurry is usually beyond them, yet they may constrain the efforts of others to accomplish this task. Local school boards used to building and managing small schools suddenly find themselves having to provide large school plants and the staff to man them; local planning boards which previously had to cope with only a few dozen new dwellings per year may now be confronted with a few thousand each year for several years. The local council will have to cope with the disruption of construction involving a few thousand men and their equipment, not to mention having to mollify old-time residents. The costs of this situation can become real in terms of time-lags, which are reflected in capital costs and congestion.

The Impact Area of Site D would probably be the least equipped to render the new development; the remaining areas could be slightly better equipped to receive growth because of the growth that some centres have already had to cope with (e.g., Newmarket, Oshawa, Georgetown, Guelph).

5. The Cost of Labor Market Competition:

A new and sophisticated facility such as an airport injected

into a local labor market could have upsetting effects on the stability of existing firms. The higher wage industries associated with the airport (such as aircraft servicing) and the accelerated labor demand which is expected in developing TORONTO II could cause these effects.

The labor markets of Sites A and C would be most affected by this factor, whereas Site D with very little present development would be dominated by the new airport labor market. Site C would be affected very little, since it already possesses high wage industries, and can draw on large local and metropolitan labour forces.

* * * * *

The "extra" costs we are here emphasizing would be most prevalent in the early part of the development process of the airport complex. Some of them, but not necessarily all, might be offset by future benefits of new cities. Some possible benefits of new cities that could be captured in the long run are reduced air pollution, lower traffic congestion, and better amenities. But since these benefits are "public goods" or "external economies", they do not have a market payoff and no direct revenues could be collected. Some costs, such as duplicating existing facilities with excess capacity, would produce no offsetting benefits or cost reductions. Finally, the costs of brand-new quarters could be minimized if the new urban development

were undertaken by public authorities who owned most of the land in the new cities and could thus recapture profits and land value appreciation (this kind of benefit is now accruing to the public authorities of British new Towns).

ON BALANCE: NET DIFFERENCES IN IMPACT OF ALTERNATE SITES

The various analyses carried out for this study and reported in Part Two were, in effect, a set of "sieves" through which we passed all the alternative sites for TORONTO II. The aim, of course, was to observe differences between sites relative to the particular filter being applied; population, capital investment, etc. The results of the individual filterings have been presented. But it still remains to examine the net results of the several sieves; i.e., "Did one or more sites consistently fail to pass the sieves?", "Were some sieves passed easily by several sites?" In this final section we shall seek answers to these and other questions in order to highlight the overall differences among the sites.

Table 20 summarizes the results of the several tests of impact which were applied to all sites. The scales were, of course, mixed, and results cannot be considered strictly comparable from say, the relative impact on population to the costs of providing urban utilities. The separate results have been summarized in terms of simple, three-point scales -- high, medium, and low. On each scale, the progression from High-Low is the same, with "high" meaning variously, a strong impact, the ability to minimize or maximize a large improvement, or a high degree of protection. "Low", therefore means the converse of these on the respective scales.

TABLE 20

COMPARATIVE SUMMARY OF IMPACT TESTS ON
ALTERNATIVE SITES FOR TORONTO II

IMPACT ON:	R A T I N G O F A L T E R N A T E S I T E S			
	A	B	C	D
The Local Area: Population (13)	MEDIUM	LOW	LOW	HIGH
Land Development (15)	MEDIUM	LOW	LOW	HIGH
Capital Investment (17)	MEDIUM	LOW	LOW	HIGH
Income Flow (18A)	MEDIUM	LOW	LOW	HIGH
Per Capita Income Improvement (18B)	LOW	LOW	LOW	HIGH
The Region: Minimizes Costs of Utilities (16)	LOW	HIGH	LOW	MEDIUM
Minimizes costs of Urbanization (19)	MEDIUM	HIGH	HIGH	LOW
Maximizes Regional Air Service (12)	MEDIUM	MEDIUM	HIGH	MEDIUM
Improves the Regional Pattern (12)	LOW	HIGH	LOW	HIGH
Protects the Regional Environment (12)	LOW	HIGH	MEDIUM	HIGH

Notes: Numbers in parentheses refer to tables in text.

One further point before discussing the results is that there are essentially two sets of impact tests represented here. In the first are measures of impact from the imposition of Toronto II on the local area compared to the "normal" expectations for the area. In the second set are the relative costs, or ease, or level of improvement attendant upon the region with TORONTO II at one site or another.

Striking a Balance

1. Across the whole array of impact tests, Site D is almost uniformly a high impact location for TORONTO II. This is true not only for what TORONTO II and the airport complex would bring to the locale, but also how it would offer strategic advantages on several facets of regional development.
2. Site B offers the highest impact in terms of regional advantages in costs of services, costs of urban development, protection and enhancement of the region's pattern. That is, excluding the impact on levels of population and investment, etc. in the locale, TORONTO II would afford a high impact at Site B.
3. Site C is strong from the point of providing good access for regional air traffic and the ease of urbanization associated with the complex. However, it is of much less strength in

promoting regional development, and would also be costly to service.

4. Site A presents a mixed picture: it would be strongly affected by the development that TORONTO II would bring to its locale, but the location in the region of this same development would pose several difficult developmental problems.

On the basis of this final analysis, the four sites, in order of preference are as follows:

1. SITE D - Impact Area will show the largest growth with the establishment of TORONTO II, and location in the region will facilitate and enhance regional development;

or

SITE B - Impact Area will easily absorb growth generated by TORONTO II and location is advantageous to overall regional development.

2. SITE C - Impact area will easily absorb growth generated by TORONTO II, but development costs will be the highest of the four sites; location will impede some aspects of regional development.
3. SITE A - Impact Area will be fairly strongly affected by the growth associated with TORONTO II; location will bring site into conflict with several important regional features.

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A P P E N D I X A

PERSPECTIVES ON THE D.O.T. FORECAST
OF AIR PASSENGER MOVEMENTS FOR THE
TORONTO REGION

Air passenger forecasting is one of the lesser sophisticated varieties of forecasting in use today. Although factors such as price reduction rates, population projections, and increased propensity to travel have been included in various forecast methodologies, many unknowns have yet to be resolved. For instance: "At what rate will our leisure time increase? - Will it be used for more travel? What proportion of travel will be by air? What will be the effect of larger and faster aircraft? Will new high-speed ground transportation be a substitute?". These are only a few of the pertinent questions that cannot currently be answered, but yet each can gravely affect future airline patronage.

Another complicating dimension is the actual technological state that air flight is in at the moment. Fast, long-distance air travel is a relatively new phenomenon: Therefore it may be helpful to look at another travel industry. When it was in a comparable development phase, the automobile industry had increasingly high average annual consumption rates. If these past acceleration rates held true, the current ownership rate would be tremendously higher than it presently is. In per capita terms, car ownership has tended to level off,

and accurate estimates of ownership and trips are possible. But this is not yet possible with air traffic: per capita trips are still very much on the increase for all categories of flights, and it is still not known where these will stabilize.

If the high average air traffic growth rates of the recent past are applied in a straight-line manner, we would soon be forecasting scores of trips per person annually. Obviously, this will not be the case: the profile of the forecast curve will tend to resemble a logistics curve, much as has happened with automobile ownership. But trend lines approximating those of the past 15 to 20 year period are currently being used, with no indication of a levelling off in the next 30 years. After 1985, the average annual rate of air passenger growth is expected by the Canada Department of Transport (DOT) to be 12% and continue to at least the Year 2000.

A look at the forecasted growth rate of the Ontario gross provincial product (G.P.P.) may help to place the problem in perspective. The G.P.P. is expected to increase at a maximum of 6.2% annually: we may apply this figure to two different base passenger years, assuming growth in air travel to be closely related to economic growth. A 1968 base of 4.5 million passengers representing the actual Malton level would give a Year 2000 total of 30.8 million passengers. If, however, we accept the 1985 DOT base of 18.9 million passengers and apply the G.P.P. rate from there, the Year 2000 total would be 46.6

million passengers through Toronto airports.

As shown in the accompanying table (A-1), these totals are substantially different from the two offered by DOT. In both of their projections, DOT has used an annual increment of 8.8% to 1985, yielding 18.9 million passengers. From that time on, growth is projected to increase at an even faster rate - 12% annually - such that by Year 2000 there would be 96.4 million passengers accommodated yearly by both Malton and TORONTO II. Even the most "pessimistic" DOT view foresees at least a continuation of the 8% rate, giving 60.0 million passengers by Year 2000.

In terms of today's totals (1965), this 96 million would represent the present combined activity of all three New York airports, Chicago's O'Hare, Los Angeles, Atlanta, San Francisco, Washington (National), Miami, Boston, Dallas-Ft. Worth, Detroit, Kansas City, and Seattle-Tacoma.¹ To gain another perspective, compare this 96 million to the 400 million passengers forecast for the entire United States in 1979 (F.A.A.).

Air traffic of 96 million passengers in an area with a maximum Year 2000 population of approximately 7 million persons seems unrealistic.² But yet the "low" forecasts may be too low. For Toronto is a "national centre" connecting Canadian cities to one another and to

¹S.G. Lardiere and F.E. Jarema, "Impact of Projected Air Travel Demand on Airport Access," in Highway Research Record, E.W. Jackson ed., Washington: Nation Research Council, 1969, Number 274, P.24.: also see Appendix B, Table B-4.

²From forecasts prepared by the Economic Analysis Branch, Department of Treasury and Economics, December 30, 1969.

TABLE A-1

ALTERNATE FORECASTS OF AIR PASSENGER
MOVEMENTS FOR TORONTO REGION AIRPORTS
(MILLIONS OF PASSENGERS)

	YEAR	(1)	(2)	(3)	(4)
		(a)	(b)		
PAST (Malton only)	1967	3.3	3.3		3.3

	1968	4.5	4.5		4.5

FUTURE	1970	5.3	5.3		5.1

EARLIEST POSSIBLE OPENING	1975	8.1	8.1		6.8

	1980	3.6	12.4		9.3
		8.8			
	1985	5.4	18.9	18.9	12.5
		13.5			
	1990	8.7	32.5	27.8	16.9
		23.8			
	1995	14.0	55.9	40.8	22.8
		41.9			
	2000	22.55	96.4	60.0	30.8
		73.9		46.6	

- NOTES: Columns 1 (b), 2, 3 and 4 are combined totals for both airports. Column 1 (a) is subdivided by airport, the top figure for each year representing Malton; the bottom TORONTO II.
- (1) Federal DOT forecast, based on:
- (i) an 8.8% average annual increase to 1985.
 - (ii) a 10% average annual increase 1985-2000 for Malton
 - (iii) a 12% average annual increase 1985-2000 for TORONTO II.
- (2) Federal DOT forecast, based on:
- (i) an 8.8% average annual increase to 1985.
 - (ii) an 8% average annual increase to 2000.
- (3) RDB forecast, based on:
- (i) Federal DOT forecast to 1985 of 8.8% annually.
 - (ii) Average annual increase of Gross Provincial Product of 6.2%, 1985-2000.
- (4) RDB forecast, based on Gross Provincial Product of 6.2%, 1968-2000.

other countries. Thus, the forecast extremes of 96 and 30 million passengers are both probably incorrect, with the most likely prediction being somewhere in the middle of the two expectations; i.e., between 47 and 60 million passengers yearly at 2000 -- or about 54 million passengers.

If indeed, the actual level of passengers more closely approximates the latter forecast than that of the DOT, there will be significant implications for planning and development of TORONTO II. In general, TORONTO II's complex will not grow as large or fast as our studies of impact had to assume. For example, the assumed level of operations for 1990 at TORONTO II for the impact studies was about 24 million passengers yearly. Under the lower forecast, that level would not be reached until nearly five years later. The differences become even more striking as we view 2000 levels, (see Table A-2) by which time the lower forecast is just over one-half of the DOT (high) forecast for TORONTO II.

TABLE A-2
OPERATING LEVEL OF TORONTO II UNDER
ALTERNATE AIR PASSENGER FORECASTS

	TORONTO II UNDER	
	DOT FORECAST ¹	RDB FORECAST ²
	(millions of passengers)	
1985	13.5	13.5
1990	23.8	19.6
1995	41.9	28.2
2000	73.9	40.8

NOTES: 1. See Table A-1, Col. (1).
2. Based on mean of cols. (2), (3) and disaggregated for TORONTO II using same proportion as DOT forecast.

These speculations are about the effect on TORONTO II, but the growth of Malton is an important factor in the picture presented by DOT. Would Malton still grow to the 22 million passenger level at 2000? Or less? What would be the proportions of total passengers between the two airports?

The importance of changes such as these in the growth parameters for TORONTO II are of two kinds: first, it will reduce the overall impact on the region which will have reached a higher level of development before the advent or maturity of TORONTO II; and second, it points up the tenuous foundation of our planning for TORONTO II and suggests the need for constant surveillance of all factors in this planning operation.

A P P E N D I X B

TABLE B-1

DERIVATION OF "NORMAL" INCOME

<u>SITE</u>	(1) AVERAGE FAMILY EARNINGS 1961	(2) AVERAGE FAMILY EARNINGS 1966	(3) PER CAPITA EARNINGS 1966	(4) TOTAL ANNUAL INCOME FLOW 1966	(5) TOTAL ANNUAL INCOME FLOW 1990
(Millions, \$ 1969)					
A	5,343	8,282	2,238	226.2	352.9
B	5,231	8,108	2,191	871.8	1360.0
C	5,075	7,867	2,126	1,510.3	2356.4
D	4,520	7,006	1,894	71.4	111.4

Notes: All above calculations are averages for major towns in each impact area, i.e.,

A. Aurora
Newmarket

B. Oshawa
Whitby
Bowmanville

C. Guelph
Georgetown
Milton
Acton

D. Orangeville
Fergus

Sources: 1. Census of Canada, 1961; 93-519
 2. Census of Canada, 1966; 93-609
 3. Column 2 ÷ 3.7 persons per family
 4. Column 3 X 1990 "normal" or "basic" population
 (see Appendix B, Table 3).
 5. Column 4 X 1.56 1969 incomes were expanded by an average annual of
 2.25 percent to 1990 to account for annual productivity im-
 provement. (i.e., a multiplier of 1.56).

TABLE B-2

SIZE OF "NOISE LANDS"

	(1)	(2)	(3)
<u>SITE</u>	<u>TOTAL NOISE LANDS</u>	<u>TOPOGRAPHIC AND SPECIAL RESTRICTIONS</u>	<u>REMAINDER</u>
A.	57,200	15,600	41,600
B.	73,600	20,100	53,500
C.	82,800	21,400	61,400
D.	82,800	18,200	64,600

- Notes: 1. Water occupies 25,600 acres of Site A Noise Lands.
Water occupies 1,200 acres of Site B Noise Lands.
2. Consist of lowlands, wetlands, islands, residential resorts, Indian Reserves, and Escarpment Control Lands.

Source: Project Planning Associates Limited, 1970.

TABLE B-3

FUTURE POPULATION GROWTH
IN IMPACT AREAS

<u>SITE</u>		<u>1966</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>2000</u>
Growth Rate		2.4%	2.2%	2.1%	2.0%	
A.	Basic Population ¹	58,600	81,700	91,100	101,100	123,200
	Airport " ₂	-	62,800	94,300	139,100	291,200
B.	Basic Population	168,900	284,900	338,300	397,900	540,000
	Airport "	-	59,650	94,100	143,890	311,300
C.	Basic Population	311,500	518,500	609,800	710,400	954,600
	Airport "	-	56,500	88,370	134,390	290,630
D.	Basic Population	25,800	30,900	34,100	37,700	41,600
	Airport "	-	62,800	93,380	137,120	285,580

- Notes:
1. Growth rates represent annual compound rates.
 2. Growth rates re basic population predicted on analysis of historical growth within the impact area.
 3. Airport related population assumed to take on growth characteristics of the basic population.

Source: Canadian Urban Economics Limited, Dec. 1969.

TABLE B-4

SCHEDULED PASSENGERS AT SELECTED MAJOR
UNITED STATES AIRPORTS 1965
(thousands)

Chicago - O'Hare	17,336
New York - Kennedy	14,196
- La Guardia	4,324
- Newark	4,574
Los Angeles	12,058
Atlanta	6,694
San Francisco	6,680
Washington - National	6,348
Miami	5,558
Boston	5,170
Dallas-Ft. Worth	5,110
Detroit	3,670
Kansas City	2,412
Seattle-Tacoma	2,250
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TOTAL	96,380

Source: S. G. Lardiere and F.E. Jarema, "Impact of Projected Air Travel Demand on Airport Access", in Highway Research Record, E.W. Jackson ed., Washington: National Research Council, 1969, Number 274, P.24.



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